

**MULTIPLE-PHASE DC-DC CONVERTER TOPOLOGY**ABSTRACT OF THE DISCLOSURE

A multiple-phase DC-DC converter adds at least one additional phase to an N-phase DC-DC converter to improve the converter's response to changes in load. In one  
5 embodiment, an additional phase operates at a switching frequency greater than that of the N phases, to generate a current which is added to the N phase currents to improve the converter's response to changes in load. In another  
10 embodiment, an additional phase is configured to improve the converter's response to a load release. Here, the additional phase is kept off during load increase and steady-state conditions. However, when a load release occurs, the additional phase is turned on and acts to  
15 extract current from the converter's output terminal while the N phase currents slowly fall, to reduce the magnitude of output voltage overshoot that occurs on load release.